

# 2005 NASA Space Radiation Summer School

## Draft Schedule of Course Activities

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### Thursday, May 26

#### **Morning, Medical Department:**

8:30-11:00 Students arrival. Security and housing.

#### **Afternoon, Medical Dept. Small Conference Room**

13:00 Student orientation. General Tour

#### ***BNL Training Part 1, RHIC-AGS USER CENTER***

14:00 Verification of Credentials and Training Status

15:30 Complete On-line course work at Users' Center and Medical (Radiological Worker I)

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### Friday, May 27

#### **Morning, Medical Dept. Small Conference Room**

8:30 Daily Announcements

#### ***BNL Training Part 2, CAD Snyder Room***

9:00 NSRL Radiobiology User Training lecture and exam

Issue Film Badges

Iris Scans at AGS MCR

#### **Afternoon, Medical Dept. Small Conference Room**

13:00 Orientation to Medical Department and Labs

BLAF Animal Care Video

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### Monday, May 30

#### **Morning, Medical Dept. Small Conference Room**

8:30 Welcome, Registration and Announcements

M. Vazquez, G. Nelson

#### *Lecture Series 1: Overview*

9:00 Space Radiobiology Overview

G. Nelson

10:00 How to Do an Accelerator Experiment

G. Nelson, M. Vazquez

11:00 Fixtures and Logistics

M. Vazquez

#### **Afternoon, Medical Dept. Small Conference Room**

#### **Other facilities**

Loma Linda, Chiba, GSI, BEVALAC

#### **NSRL-MCR-AGS-CAD Tour**

#### **NSRL Beam Time Request Mockup Assignment**

#### **Evening**

**16:00 Reception with Lecturers and Course Participants**

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## **Tuesday, May 31**

### **Morning, Medical Dept. Small Conference Room**

8:30 Daily Announcements

#### *Lecture Series 2: Physics 1*

9:00	Properties and Types of Ionizing Radiation	T. Borak
10:00	Interactions of Radiation with Condensed Matter	T. Borak
11:00	Track Structure	L. Braby

### **Afternoon, Medical Dept. Small Conference Room**

#### *Lecture Series 3: Physics 2*

13:00	Distributions of Energy Deposition Events	L. Braby
14:00	Doses, Fluences and Dose Rates	L. Braby

#### *In-class calculations*

General Discussion

### **Evening**

***18:00 Reception with Lecturers and Course Participants***

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## **Wednesday, June 1**

### **Morning, Medical Dept. Small Conference Room**

8:30 Daily Announcements

#### *Lecture Series 4: Practical Aspects of Radiation Exposures*

9:00	Accelerators Made Simple	D. Lowenstein
10:00	Particle Accelerators (physics and operations)	K. Brown
11:00	Measurement of Radiation	A. Rusek

### **Afternoon, NSRL**

13:00	Target Area, Exposure Design and Dosimetry	A. Rusek
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#### ***Physics Activities:***

15:00	Tour NSRL Beam line-Target Area	A. Rusek, M. Vazquez
	Ion Chamber / Survey Meter Measurements	
	X-ray Film Development and Uniformity.	
	Segmented Ion Chamber at NSRL	
	Bragg Curve Determination	

### **Evening**

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## **Thursday, June 2**

### **Morning, Medical Dept. Small Conference Room**

8:30 Daily Announcements

#### *Lecture Series 5: Radiation Chemistry*

9:00 Radiolysis of Water and Macromolecules

P. O'Neill

10:00 DNA Damage and Measurement

B. Sutherland

#### *Lecture Series 6: Cellular Radiobiology I*

11:00 Cellular Radiobiology, Basic Concepts

E. Hall

### **Afternoon, Medical Dept. Small Conference Room**

13:00 Measuring Radiation Damage

E. Hall

14:00 RBE, LET, OER and Cross Sections

R. Setlow

15:00 Apoptosis

A. Kronenberg ???

General Discussion

### **Evening**

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## **Friday, June 3**

### **Morning, Medical Dept. Small Conference Room**

8:30 Daily Announcements

#### *Lecture Series 7: Cellular Radiobiology II*

9:00 Cell Cycle

C. Anderson

10:00 DNA Repair Mechanisms

B. Sutherland

#### *Lecture Series 8: Genotoxicity*

11:00 Mutation and Instability

A. Kronenberg ???

### **Afternoon**

#### *Lecture Series 9: Cellular Radiobiology III*

13:00 Low Dose and Bystander Effect

P. O'Neill/K. Held

14:00 Microenvironment

S. Costes

#### *Laboratory Exercise Protocols and Planning I*

General Discussion

Homework Assignment 1. Due Monday 6/6.

**Evening.      Social Event**

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## **Monday, June 6**

### **Morning, Medical Dept. Small Conference Room**

8:30 Daily Announcements

#### *Lecture Series 10: Radiation Carcinogenesis*

9:00	Cell Transformation	B. Ullrich
10:00	Leukemogenesis	B. Ullrich
11:00	Solid Cancers	J. Dicello
12:00	Countermeasures	A. Kennedy
	General Discussion	

### **Afternoon**

*Low LET Laboratory I      CERF irradiation of samples*

### **Evening**

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## **Tuesday, June 7**

### **Morning, Medical Dept. Small Conference Room**

9:00	Space Radiation Environment	R. Turner
10:00	Radiation Transport & Shielding	J. Miller

### **Afternoon**

*Low LET Laboratory II      Instructors / Advisors*  
T24 Sample processing.

### **Homework Review**

### **Evening**

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## **Wednesday, June 8**

### **Morning, Medical Dept. Small Conference Room**

8:30 Daily Announcements

#### *Lecture Series 11 CNS Effects*

900	Responses of Neural Cells	J. Fike
1000	Responses of Brain	M. Vazquez
1100	Behavior	B Rabin
	General Discussion	

### **Afternoon, Medical Dept. NSRSS Laboratories**

*Low LET Laboratory III      Instructors / Advisors*  
T48 Sample processing

### **Evening**

**Social Event**

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## **Thursday, June 9**

### **Morning, Medical Dept. Small Conference Room**

8:30 Daily Announcements

#### *Lecture Series 12: Late Effects*

9:00 Tissue Remodeling and Late Effects

S. Costes

10:00 Cataractogenesis

B. Worgul

#### *Final Lecture Series:*

11:00 Risk Analysis Synthesis

F. Cucinotta

13:00 NASA's Space Radiation Health Program

W. Schimmerling

General Discussion

### **Afternoon, Medical Dept. NSRSS Laboratories**

#### *Low LET Laboratory IV*

*Instructors / Advisors*

13:00 Low-LET Data collection and reduction. Data Analysis,

15:00 Classroom Exercises

### **Evening**

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## **Friday, June 10**

### **Morning, Medical Dept. Small Conference Room**

8:00 Daily Announcements

8:15 Turn in Homework Assignment 2

8:30 *High LET Laboratory I-II: Physics at NSRL*

#### *All Groups:*

NSRL Logistics Planning, Access training

A. Rusek, M. Vazquez

Set-up and Calibration. Irradiate Physics Samples

Tear Down. Collect Dosimetry Data and Films

### **Afternoon, Medical Dept. Small Conference Room**

#### *High- LET Laboratory V*

*Instructors / Advisors*

16:00 Cell Experiment Planning and Set-Up

### **Evening**

Social Event

19 :00 Chromosome Aberrations

M. Durante

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## **Monday, June 13**

### **Morning, Medical Dept. NSRSS Laboratories**

8:00 Daily Announcements

#### ***High LET Laboratory II: Biology***

8:30 Logistics Instructors / Physicist  
Set-up and Calibration

### **Afternoon,**

13:00 Heavy Ion Exposures M. Vazquez-P. Guida

17:00 Tear Down Logistics. Collect Dosimetry Data and Films

### **Medical Dept. Small Conference Room**

17:30 All Groups:  
Discussion of Run Instructors  
Develop Films Film Densitometry. Physics Data Reduction

Homework Assignment 3: Sham Accelerator Experiment Protocol and Beam time Request – due Wednesday

### **Evening**

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## **Tuesday, June 14**

### **Morning, Medical Dept. Small Conference Room**

8:30 Daily Announcements

9:00 Discussion of Run. Develop New Films..  
Physics Data Reduction

### **Afternoon, Medical Dept. NSRSS Laboratories**

#### ***High LET Laboratory III: Biology***

13:00 T24 Samples

### **Evening.**

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## **Wednesday, June 15**

### **Morning, Medical Dept. Small Conference Room**

8:30 Daily Announcements

9:00 Turn In NSRL Beam Time Request Proposal

### **Afternoon, Medical Dept. NSRSS Laboratories**

#### ***High LET Laboratory IV: Biology***

13:00 T48 Sample Processing.

**Evening: Informal Social Event with Accelerator Physics Team**

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## **Thursday, June 16**

### **Morning, Medical Dept. Small Conference Room**

8:30 Daily Announcements

9:00 **Data collection and reduction**

### **Afternoon, Medical Dept. NSRSS Laboratories**

13:00 **Final data collection and reduction**

Compare high and low LET results and discuss with experts

Return Graded Homework Assignment 3

### **Evening**

**Issue Certificate of Completion and Social Event**

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## **Friday, June 17**

### **Morning, Medical Dept. Small Conference Room**

8:30 Daily Announcements

9:00 **Review of Beam Time proposals**

### **Afternoon, Medical Dept. NSRSS Laboratories**

**Issue Certificate of Completion and Social Event**